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ABSTRACT

In an application of contingency theory, data from 45 Arizona schools were analyzed to determine the relationships between three sets of independent variables (organizational structure, leadership style, and environmental characteristics) and the dependent variable (organizational effectiveness as perceived by principals and teachers). Contingency theory focuses on the internal adjustments of organizations seeking to modify procedures to cope with change. Using the school as the unit of analysis, responses to an adaptation of Motts Organizational Effectiveness Questionnaire were obtained from 45 principals and 364 teachers (selected through a 20 percent random sample of teachers at each school). The data analysis procedure involved constructing a full model that included all the independent variables and the one dependent variable, and applying multiple linear regression. Restricted models were then constructed by removing variable sets one at a time. To further refine the analysis of the environmental factors, a factor analysis was performed. Findings are presented in text and tables. Among the findings are: (1) the three sets of variables, taken together, are significantly related to perceived effectiveness, leadership style being the most powerful predictor; and (2) the more formalized the school's organizational structure, the greater the teacher's perception that the school was effective. (MLF)

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An Exploratory Contingency Model For Schools

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7 November 1983

Data from forty-five Arizona schools were analyzed in the context of an exploratory model to examine the relationships between environmental characteristics, organizational structure, principal's leadership style, and perceived organizational effectiveness in an application of contingency theory to schools.

EA 016 226

An Exploratory Contingency Model For Schools

Educational institutions face, as do other institutions, uncertain environments. Demands for accountability, decline in available tax, revenue, declining enrollments, decreasing energy sources and a multitude of other environmental constraints may cause educational institutions to respond by ignoring these uncertainties, dealing with them one at a time on a short term basis, or structuring the organization and leading it in a manner that is contingent upon changes in the environment so that an effective response is created. Hanson and Brown argue that

> Contingency theory... concentrates its analytical focus on the adjustments internal to the organization as it seeks to modify procedures to meet the changing demands of the open system. Thus, the contingency perspective stressed that the school requires capabilities to cope with changing environmental needs and demands.

Precision in determining what might be the "best response in terms of effectiveness to changes in the environment has not been established.

The purpose of this study was to explore some organizational variables in the context of environmental factors. The relationships thus derived may be useful for organizational theorists studying schools and ultimately for school administrators in determining the most effective response to environmental changes. Thomas, speaking before the National

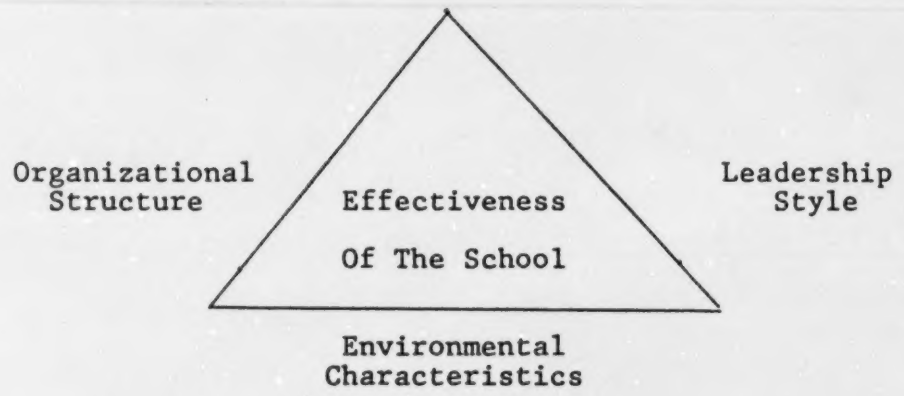
Conference of Professors of Educational Administration concluded with,

> I believe contingency theory to be a refreshing excursion into synthesis of a variety of disparate efforts to discover the correlates of organizational effectiveness. I should like to encourage those who are interested to share in larger efforts to assess this theoretical movement and its utility as an explorer in organizational phenomena in education.[2]

An Exploratory Contingency Model

To clarify the variable relationship in this study the following model was used:

Figure 1. Relationships Between Structure, Leadership Style, Environment, and Effectiveness in Schools.



The dependent variable was organizational effectiveness as perceived by principals and teachers. Organizational effectiveness was defined by Mott as "the ability of an organization to mobilize its centers of power for action-production and adaptation."[3] Motts Organizational Effectiveness Questionnaire[4] was adapted for educational organizations and used in this study. The adaption was in terms of minor

wording changes only such as substituting "school" for other organizational descriptors. Mott reports several studies indicative of the validity of the questionnaire. Using Cronbach's "alpha" coefficient a reliability estimate of .85 was established.[5]

Independent variables examined in this study were grouped into three sets: (1) organizational structure, (2) leadership style, and (3) environmental characteristics. Organizational structure was defined by Mintzberg as "the sum total of the ways in which it divides its labor into distinct tasks and then achieves coordination among them."[6] Hage proposed and tested eight structural variables: complexity, centralization, stratification, formalization, adaptiveness, production, efficiency, and job satisfaction.[7] The first four of these variables were designated as means while the remainder were ends variables. The eight variables were used to define two organizational types, organic and mechanistic. An organic type was characterized by high complexity, low centralization, low formalization, low stratification, high adaptiveness, low production, low efficiency, and high job satisfaction. A mechanistic organization was the opposite of organic for all eight variables. Hage and Dewar[8] further defined and tested three means variables; complexity, centralization, and formalization. Indices for each variable were defined and tested to measure organizational structure. Complexity dealt with the number of occupational specialities and the extent and type of professional activity. Centralization was the extent

to which organizational members participated in decision making. Formalization consisted of job codification and rules as well as the extent to which there was observation (compliance) of the rule. Hage, and Aiken provide scoring mechanisms and additional information regarding the creation of these variables.[9]

Administrative role performance was defined in terms of Fiedler's concept of leadership style. Leadership style refers to the underlying need structure of the leader that motivates behaviour in various leadership situations.[10] Fiedler developed the "Least Preferred Co-Worker Questionnaire" (LPC) to measure two leadership styles.[11] "Task oriented leaders score low on the LPC scale and are motivated by (i.e. derive satisfaction from) successful task accomplishment. Conversely, relationship oriented leaders score high on the LPC and receive satisfaction from successful interpersonal interactions."[12] Fiedler felt that effectiveness of leadership style was dependent upon leader-member relations and developed the "Group Atmosphere Scale (GAS) to measure this relationship. Both the LPC and GAS are sematic differential scales administered to the leader. In this study the scales were administered to the school's principal. The validity of the LPC and GAS has been reported favorably in numerous studies. Several studies note the reliability is well within the range of other widely used personality measures.[13]

The third set of independent variables in this study were environmental characteristics. Mintzberg defines environment as comprising "virtually everything outside the organization, it's "technology" (i.e. the knowledge base it must draw upon), the nature of its products, customers competitors, it's geographical setting, the economic, political, and even meterological climate in which it must operate, and so on." It also consists of "...factors intrinsic to the organization itself - it's age, size and the technical system it uses in its operating care."[14] Mintzberg goes on to define characteristics of organizational environment as four continua: 1. stable to dynamic, 2. simple to complex, 3. intergrated to diversified, 4. munificient to hostile. For this study the four characteristics were adapted into a Likert questionnaire format as follows:

1. Stable $\frac{}{1}\ \frac{}{2}\ \frac{}{3}\ \frac{}{4}\ \frac{}{5}\ \frac{}{6}\ \frac{}{7}\ \frac{}{8}$ Dynamic

   For this scale "stable" means relatively little change occurs while "dynamic" means the environment is turbulent with considerable change occuring.

2. Simple $\frac{}{1}\ \frac{}{2}\ \frac{}{3}\ \frac{}{4}\ \frac{}{5}\ \frac{}{6}\ \frac{}{7}\ \frac{}{8}$ Complex

   For this scale "simple" means that knowledge needed to meet the demands of the environment can be broken into easily comprehended components while "complex" environments requires the organization to have a great deal of sophisticated knowledge about its clients, placement opportunities, market demand, etc.

3. Integrated ___ ___ ___ ___ ___ ___ ___ ___ Diversified
1 2 3 4 5 6 7 8

In terms of the kind of market in the environment "intergrated" refers to a single or very limited set of opportunities for service while "diversified" refers to a broad range of opportunities for the school's service to its' environment.

4. Munificent ___ ___ ___ ___ ___ ___ ___ ___ Hostile
1 2 3 4 5 6 7 8

If the environment is friendly, supportive and little competition exists it can be said to be "munificent." If on the other hand the environment is unfriendly, competitive, and relationships with other organizations are stressful, it can be termed "hostile".

Another set of variables were obtained from responses of the principal of the school. These environmental factors were school enrollment, district enrollment, percentage of the school's enrollment that were Anglo, percentage of the school's enrollment who spoke a language other than English at home, cost per student, assessed valuation of the district per student, rate of teacher turn over, school age, private school enrollment trends in the district, school enrollment trends, community stability, population density, results of school bond and city bond elections, and results of attempts to recall board members. This somewhat random set of variables were selected as possibly important factors in a school's environment. Changes in these factors may contribute to uncertainty.

A number of researchers have recently explored the relationship between organizational structure and environmental characteristics. Woodward found a close relationship between structure and technology within a firm.[15] Lawrence

and Lorsch found that environmental conditions surrounding the organization affected structure in terms of differentiation and intergration.[16] A series of studies by Pugh, Hickson, and others, generally referred to as the Aston studies, found that organizational size explained many structural characteristics.[17] Khandwalla found that these relationships were more complex than had been previously indicated.[18] The intent of this study was to explore environmental characteristics, organizational structure, and leadership style of the principal in relationship to one another and to perceived effectiveness of schools.

Hypotheses

1. Taken together, organizational structure, leadership style, and environmental characteristics are significantly related to perceived organizational effectiveness.

While one may assume that such relationships are somewhat tautological it seemed worthwhile to test the hypothesis in terms of relative strength of the relationships.

2. Taken separately, organizational environment is a significant factor in predicting perceived organizational effectiveness.

By surpressing its value in a restricted model containing leadership style and organizational structure, organizational environment was tested in two ways; first using Mintzberg's environmental characteristics and second by using selected environmental factors. Difficulty in measuring environmental

uncertainty has been a problem for organizational theorist. It was the intent of this study to develop some means of more clearly measuring conditions in the environment which may have a pronounced effect on perceived effectiveness.

3. Taken separately, organizational structure will be a significant factor in predicting perceived organizational effectiveness.

Miskel, Fevurly, and Stewart found that formalization, complexity, and participative climates are postive predictors of perceived organizational effectiveness.[19] This finding was contrary to their hypothesis and therefore requires further testing.[20] Based on Hage's Axiomatic Theory[21] it was expected that complexity would be negatively related to effectiveness while centralization would be positively related.

4. Taken separately, leadership style will be a significant factor in predicting perceived organizational effectiveness.

Hoy and Miskel report that, "Research studies in public schools provide evidence to support Fiedler's theory; the effectiveness of an elementary school was found to be contingent on the leadership style of the principal and the favorableness of the situation."[22] Leadership alone as well as leadership in view of environment was considered.

Methodology

From the list of schools published by the Arizona Department of Education fifty-four schools were randomly selected and asked to participate in the study. Of the fifty-four, forty-five agreed to participate. Forty-one of the participating schools were public and four were administered by the Bureau of Indian Affairs. Table 1 displays the participating schools categorized by school type and enrollment.

The principal from each school responded to sets of questionnaires as did a randomly selected twenty per cent sampling of teachers in each school. A listing of teachers arranged in alphabetical order was numbered consecutively for each school. A set of random numbers from a number table was selected and applied to the list to obtain a twenty per cent sample. If a teacher elected not to participate an alternative teacher, by number, was selected to assure the 20% sample. The total number of principals participating was forty-five and there were 364 teachers selected. The school was the unit used in the analysis.

Generally the data analysis procedure used was to construct a full model, one which included all the independent variables and one dependent variable, and applying multiple linear regression. Restricted models were then constructed by removing variable sets (i.e. organizational structure) one at a time. The resulting multiple R's, R squares, and F values were then compared.[23]

TABLE 1

Participating Schools by
Type and Enrollment

	Enrollment (Average Daily Membership)				
Type	0-249	250-499	500-749	750-999	1000 +
High Schools	1	1	3	1	8
Intermediate OR Junior High School	0	2	2	1	0
Elementary School	2	7	10	4	2
All Grades Combined*	0	1	0	0	0

*Grades K-12 under one principal

Data Analysis

Table 2 displays the correlation coefficients for all variables in the regression models when Mintzberg's environmental characteristics were included. Correlations with other variables was not high, particularly in relationship to the criterion perceived effectiveness.

The first full regression model (Table 3) containing the independent variable sets organizational structure, environmental characteristics derived from Mintzberg, and leadership style (LPC and GAS) with the dependent variable perception of organizational effectiveness produced a multiple R of .63 and an R squared of .40. Beta weights were included to show the direction of the relationship between the predictor variable and the criterion. R^2 change indicates the contribution of each variable to the model's R square (RSQ). "Expected direction" refers to the predicted relationship. Group Atmosphere (GAS) and formalization were significant predictors in the model. The GAS produced an F value of 6.69 ($p < .01$) while formalization produced an F value of 4.55 ($p < .01$). As a set the environmental factors were not significant predictors of perceived effectiveness.

The second full regression model was designed with several environmental factors substituted for the Mintzberg characteristics. It was expected that these factors would be the strongest predictors from the larger set responded to by principals.

TABLE 2

Correlation Matrix Including Mintzberg's Environmental Characteristics: First Model

VARIABLES	Environmental: Dynamism	Complexity	Diversity	Hostility	Leadership: GAS	LPC	Structure: Complexity	Centralization	Formalization	Organizational Effectiveness
Environmental:										
Dynamism	–									
Complexity	.46	–								
Diversity	.19	.36	–							
Hostility	.27	.09	-.31	–						
Leadership:										
Group Atmosphere	-.13	-.03	.24	-.40	–					
Least Preferred Co-Worker	-.32	-.36	-.20	-.05	-.04	–				
Structure:										
Complexity	.03	.12	-.04	-.01	.30	.03	–			
Centralization	.11	-.10	-.34	.28	-.23	.03	-.25	–		
Formalization	.12	-.04	-.05	.07	.19	.14	-.06	.09	–	
Organizational Effectiveness	-.05	-.04	.25	-.25	.54	.10	.15	-.23	.34	–

TABLE 3

Statistical Relations of Predictors to the Criterion Organizational Effectiveness: First Full Model

RSQ: Full Model .40 Multiple R: Full Model .63

	R^2 Change	Expected Direction	Beta	F	Probability
Environmental:					
Dynamism	.002	–	-.02	.30	NS
Complexity	.000	–	-.10	.39	NS
Diversity	.079	–	.14	.80	NS
Hostility	.023	–	-.01	.00	NS
Leadership Style:					
Group Atmosphere	.209	+	.43	6.69	$<.01$
Least Preferred Co-Worker	.004	+	-.09	.42	NS
Organizational Structure:					
Complexity	.000	–	.03	.07	NS
Centralization	.005	+	.09	.41	NS
Formalization	.075	+	.29	4.55	$<.01$

df = 9/36

F = 2.68 ($P < .05$)

With these factors, along with the same leadership style and structural variables as the first model, the second full model was run. This model produced the following values: Multiple R=.73, RSQ=.54, F=2.62 ($p<.05$), df=14/31. As in the first full model GAS and LPS, the leadership style variable, produced conflicting results. GAS was a positive and significant variable in the model while LPC was negatively and insignificantly related to the criterion.

The second full model was run again with GAS and LPC replaced by an item from the questionnaire which ask teachers to describe their principal's leadership style on a scale from 1, task oriented, to 5, humanistically oriented.

Table 4 displays correlation coefficients for the second full model as modified with the inclusion of principal's style. Table 5 gives the values derived from the regression analysis of the model

With a multiple R of .71 and an RSQ of .50 the second model was an improvement over the first. The set of variables included predicted the criterion to a higher degree. As indicated in Table 5 several of the environmental factors were significant predictors. Formalization remained a strong structural variable while leadership style as measured by the principal style item was not a significant variable.

To further refine the analysis of the environmental factors a factor analysis was performed. Three major factors

TABLE 4

Correlation Matrix for Variables in the Second Full Regression Model

	School Enrollment	District Enrollment	% Anglo	School Enrollment Trend	Community Stability	Population Density	School Bond Defeat	City Bond Defeat	Board Recall	Structural: Complexity	Centralization	Formalization	Organizational Effectiveness	Principal Style
School Enrollment	–													
District Enrollment	.32	–												
% Anglo	.12	-.03	–											
School Enrollment Trend	-.03	-.18	-.10	–										
Community Stability	-.01	-.13	.05	.58	–									
Population Density	-.24	-.25	-.37	.38	.39	–								
School Bond Defeat	-.05	.72	-.26	-.25	-.21	.10	–							
City Bond Defeat	.01	.48	-.06	.09	.18	.39	.51	–						
Board Recall	-.12	.47	-.27	.22	.24	.56	.67	.72	–					
Structural:														
Complexity	.24	.11	.11	.12	.02	-.11	-.03	-.10	-.08	–				
Centralization	.03	.11	-.14	-.11	-.07	.06	.26	.13	.20	-.25	–			
Formalization	-.19	-.02	.08	.01	.21	.13	-.04	.04	.07	-.06	.09	–		
Organizational Effectiveness	-.06	-.16	.37	-.09	+.04	-.24	-.31	-.11	-.15	.15	-.23	.34	–	
Principal Style	-.13	-.26	.35	.05	.17	-.07	-.24	.02	-.13	-.03	-.23	.27	.42	–

TABLE 5

Statistical Relations of the Predictors
to the Criterion Organizational Effectiveness:
Second Model

RSQ: Full Model .507 Multiple R: Full Model .712

Predictors	R^2 Change	Expected Direction	Beta	F	Probability
School Enrollment	.003	?	-1.46	.01	NS
District Enrollment	.021	?	- .26	.77	NS
% Anglo	.139	+	+9.25	.37	NS
School Enrollment Trends	.006	–	- .23	1.90	<.05
Community Stability	.003	?	-5.47	.10	NS
Population Density	.029	?	- .52	4.50	<.001
School Bond Defeat	.029	–	- .51	3.50	<.01
City Bond Defeat	.009	–	+7.46	.00	NS
Recall Board	.082	–	+ .73	6.21	NS
Structural:					
Complexity	.039	–	+ .18	1.74	NS
Centralization	.013	+	- .14	1.02	NS
Formalization	.110	+	+ .31	4.73	<.001
Principal Style	.017	+	+ .16	1.14	NS

df = 13/32
F = 2.5315 (P <.05)

produced were hostility (comprised of the variables school bond defeat, city bond defeat, and recall of school board), population (comprised of the variables school enrollment trend, community population stability, and community population density), cost and turn over (comprised of the variables cost per student, assessed value per student in district, and teacher turn over rate).

A third full regression model was created which used the three variables, hostility, population trends, and cost/turn over, in place of selected environmental factors. Table 6 displays the data generated by that model. None of the three factored environmental variables were significant predictors. GAS and formalization were again the significant predictors in the model.

When the third full model was restricted by removing all environmental variables the multiple R remained at .63, R Squared .40, and F rose to 4.45 ($p < .01$). Again, GAS and formalization were the significant variables in the model.

Findings

Hypothesis 1, which stated that taken together organizational structure, leadership style, and environmental characteristics are significantly related to perceived effectiveness was accepted. The first full regression model using environmental characteristics derived from Mintzberg produced an F value of 2.51 (df=10/25) which was significant at the .05 level and indicated perceived organizational effectiveness

TABLE 6

Statistical Relations of the Predictors to the Criterion Organizational Effectiveness: Third Model

RSQ: Full Model .40			Multiple R: Full Model .63		
Predictors	R^2 Change	Expected Direction	Beta	F	Probability
Environmental:					
Hostility	.015	–	-.11	.76	NS
Population	.002	–	-.13	.13	NS
Cost/Turn Over	.000	+	.01	.01	NS
Leadership Style:					
LPC	.007	+	-.10	.57	NS
GAS	.293	+	+.46	9.60	$<.001$
Structural:					
Complexity	.000	–	-.00	.00	NS
Centralization	.010	+	-.12	.76	NS
Formalization	.071	+	+.28	4.33	$<.01$

df = 8/37
F = 3.09 ($P < .01$)

was significantly related to the predictor variables. The three restricted models related to effectiveness demonstrated interesting results in that when leadership style was removed from the full model the relationship was not significant. Throughout the testing of the models the most powerful single predictor variable for organizational effectiveness was the component of leadership style measured by the Group Atmosphere Scale (GAS). In each model GAS was significant at the .001 level. Since the Beta weights for GAS were positive it was found that the higher the GAS the higher the perceived effectiveness.

The second full model (Table 5) containing selected environmental factors also produced a significant value ($F=2.53$, $p < .05$, df 13/32) as did the third full model (Table 6) containing environmental variables produced by factor analysis ($F=3.09$, $p < .01$, df 8/37).

Hypothesis 2, which stated that taken separately organizational environment is a significant factor in predicting perceived organizational effectiveness, was rejected. No matter which methods of producing environmental values was employed the restricted models with environmental variables deleted was little different than the full models containing them. Their inclusion or exclusion made no significant difference.

It was noted that when the selected environmental factors were used in the second full model (Table 5) four variables

individually reached significant levels. They were school enrollment trends, population density, school bond defeat, and recall of the board. Also, this model produced the highest Multiple R of any model tested. Again, however, when the model was restricted by removing all the environmental factors the level of probability remained at .05.

Hypothesis 3 was partially accepted. Organizational structure was a significant factor in predicting perceived organizational effectiveness only in terms of organizational formalization. In all three full models tested formalization was a significant variable. (See Tables 3, 5, & 6). It's relationship to effectiveness was consistantly positive supporting the finding of Miskel, Fevurly, and Stewart.[24] This finding regarding formalization also is supportive of Hage's Axiomatic Theory.

Organizational complexity and centralization were not significant variables in any models tested. Complexity produced inconsistant insignificant results. Centralization was consistantly negatively associated with effectiveness, but not to a significant degree, in contridiction of Hage's Axiomatic Theory.[25]

Hypothesis 4 in which leadership style was expected to be a significant factor in predicting perceived organizational effectiveness was accepted. Fiedler's group atmosphere scale (GAS) was, in the first and third model sets, significantly related to the criterion. When leadership style was removed from the models F values dropped to levels that were

not significant. GAS was consistantly positive in its relationship to effectiveness. In these same models LPC was not a significant variable and was consistantly opposite the direction expected in its relationship to the criterion.

In the second full model teachers perception of the principal's style was substituted for GAS and LPC (Table 5) and failed to contribute significantly to the models predictive power. It was, however, related, as expected, in a positive manner with the criterion.

Conclusion

Organizational structure, leadership style, and environmental contingencies, taken together, are significantly related to perceived school effectiveness. Leadership style, as indicated by results from the Group Atmosphere Scale (GAS) was the most powerful predictor. The relationship of formalization, one of the three structural variables, was also consistantly significant. The measures of environmental contingencies generally were not significant contributors, but individual environmental factors were.

Leadership style, as measured by the principal's response to the GAS, was positively related to perceived effectiveness. The more positive the principal felt about the people with whom he or she worked the more likely the teachers perception that the school was effective as indicate on their response to the Mott's Organizational Effectiveness Questionnaire.

Formalization, the extent to which there are rules and pressures for rule compliance, was also positively related to perceived effectiveness. The more formalized the school's organizational structure the greater the teacher's perception that the school was effective.

The findings regarding leadership style and organizational structure are supportive of Fiedler's contingency model which predicts that the most favorable situation would be one in which leader-member relations were good, the task was structured and the position power of the leader was high. That the principal's position power in any school is high is always debatable and that was not measured in this study. Good leader-member relations and structured tasks were found significantly related to perceived effectiveness.

Measures of environment remain elusive. Mintzberg's environmental characteristics as adapted to a response scale for this study were not significant variables in the models tested. Selected environmental factors produced some significant variables individually but as a set did not significantly affect the predictive power of the model. Those factors that were significant were, in some instance, opposite the direction expected in their relationship to perceived effectiveness. For example, recall elections for board members was significantly ($p < .001$) and positively related to the criterion. Schools experiencing recall movements were perceived as being more effective.

Factor analysis of all the selected environmental factors produced three factors subsequently incorporated into another full regression model. Again, they failed to be of significant value in the model.

For environment the question remains unanswered as to whether (a) schools were not responsive to the environment, hence no significant relationships between environment and effectiveness, or (b) such relationships do exist but the methods for measuring environment are not valid. The generalization that the effective school is one that is responsive to the school's environment is neither proven or rejected.

The contingency model explored in this study has value for persons studying schools as it was a significant predictor of perceived effectiveness. Until more definitive measures of environment are determined it as limited value for predicting the most appropriate, in terms of effectiveness, leadership style and organizational structure for uncertainties in the environment.

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